Acousto-Optic Cameras for Tunable Infrared Spectral Imaging of Planetary Atmospheres and Surfaces.

D. A. Glenar, J. J. Hillman (NASA/GSFC)

Acousto-optic RF-tunable filter (AOTF) cameras are now being demonstrated at NASA/GSFC, with support from the NASA Planetary Instrument Definition and Development Program (PIDDP). AOTF device fabrication techniques are now mature, and commercially available devices made from Tellurium Dioxide (TeO_2) operate to 5 microns wavelength with high efficiency and throughput (etendue). A near-IR AOTF camera, coupled to a 256x256 NICMOS-3 HgCdTe focal plane array has been built at GSFC, and operates from 1.6 to 3.4 microns with a spectral resolution of 13 cm^{-1}. Both optics and AOTF are cooled to eliminate instrument thermal emission at the focal plane. This camera was recently used for ground-based observations of Venus nightside emissions at Apache Point Observatory. These results are discussed elsewhere at this meeting.

A low-background 2.5 to 5.0 micron AOTF camera is also being built which uses a very low power (less than 1 watt) acoustically resonant IR AOTF, developed under the NASA Small Business Innovative Research (SBIR) Program. We will summarize the design and measured performance of both cameras, and future anticipated ground based observing demonstrations.

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Paper presented by David A. Glenar
Mail Code 715
NASA, Goddard Space Flight Center

Greenbelt MD 20771 USA
Phone: 301-286-3354
Fax: 301-286-1750
Email: Dave.Glenar@gsfc.nasa.gov

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